Precision Detector Positioner

Completed Technology Project (2016 - 2018)

Project Introduction

There is a need to precisely position detectors to enable Precision Formation Flying (PFF) of multiple spacecraft for the Distributed Spacecraft Missions (DSM). The same device is also required for upcoming coronograph missions to actively control the occulter location to precisely image solar ejections and corona phenomena. The intent of the IRAD is to develop an efficient 2-axis precision positioning mechanism with the accuracy, speed, and range of motion to satisfy multiple upcoming mission needs and advance that design TRL using spare sensors from another project and procuring commercial-grade actuators to build and functionally test an engineering unit. Environmental testing will be done as funding allows.

The objective of this IRAD is to develop a flexible in-house design of a 2-axis positioning system and do performance testing and some temperature testing in order to take that design to TRL-4, almost TRL-5. There are a variety of GSFC proposals that need this type of mechanism including a detector positioning system for the Precision Formation Flying (PFF) capability of multiple spacecraft for the Distributed Spacecraft Missions (DSM) and upcoming coronograph missions that need to actively control an occulter at the end of a long boom. Upon successful completion, a relatively small amount of additional funding would allow the environmental qualification testing needed to satisfy TRL-6 requirements.

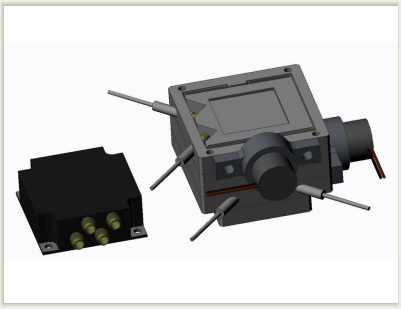
Anticipated Benefits

Having a proven, qualified design for multiple applications will allow scientists to offer low-risk proposals using high-TRL components.

An effiicient, precision 2-axis positioner could be used in many applications and markets such as jitter-control in science instruments or surveillance systems.

An effiicient, precision 2-axis positioner could be used in various DOD applications such as jitter-control in imaging or surveillance systems.

The prototype 2-axis positioner will be integrated into a multi-technology Distributed Spacecraft Mission demonstration testbed at GSFC to improve the capability to precisely maintain alignment between 2 independent spacecraft over 100's of meters separation and maintain micron-level alignment on the science detector.



Conceptual Design

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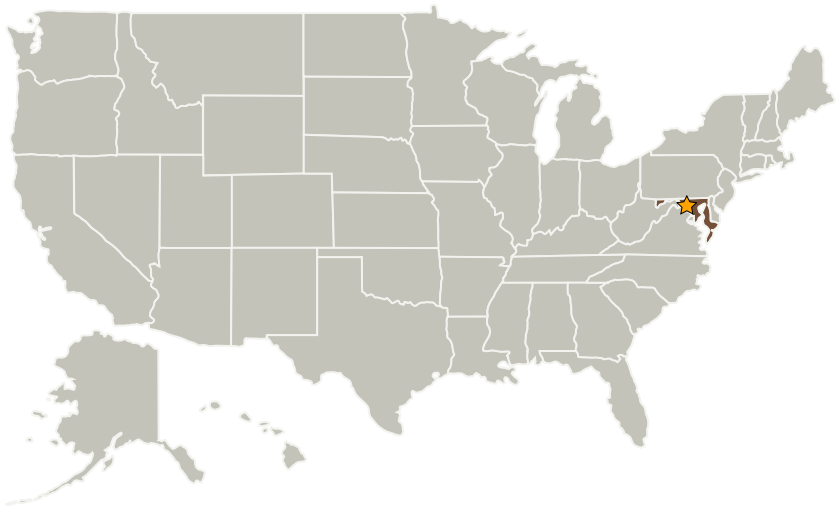
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations
Maryland

Project Transitions

October 2016: Project Start

September 2018: Closed out

Closeout Summary: With the funding we received we were able to build a first prototype and begin characterization of the mechanism. Follow on funding has been received to finish the characterization, optimize the performance, and inte grate the unit into a technology testbed.

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

Peter M Hughes

Project Managers:

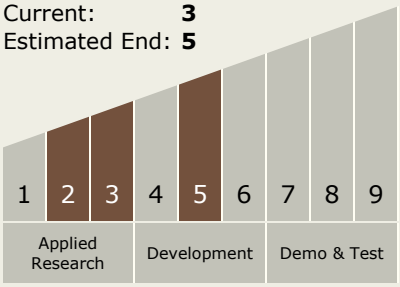
Charles D Butler
Michael A Johnson

Principal Investigator:

Gary L Brown

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **5**



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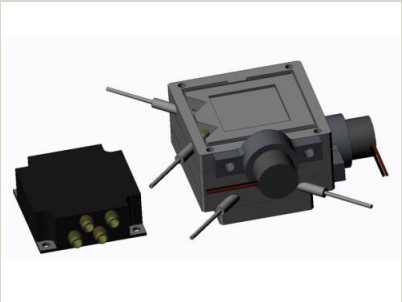
Images



2-Axis Positioner
Conceptual Design
(https://techport.nasa.gov/image/24489)

Project Website:

http://aetd.gsfc.nasa.gov/

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.2 Observatories
    - TX08.2.3 Distributed Aperture

Target Destinations

The Sun, Others Inside the Solar System

Supported Mission Type

Projected Mission (Pull)